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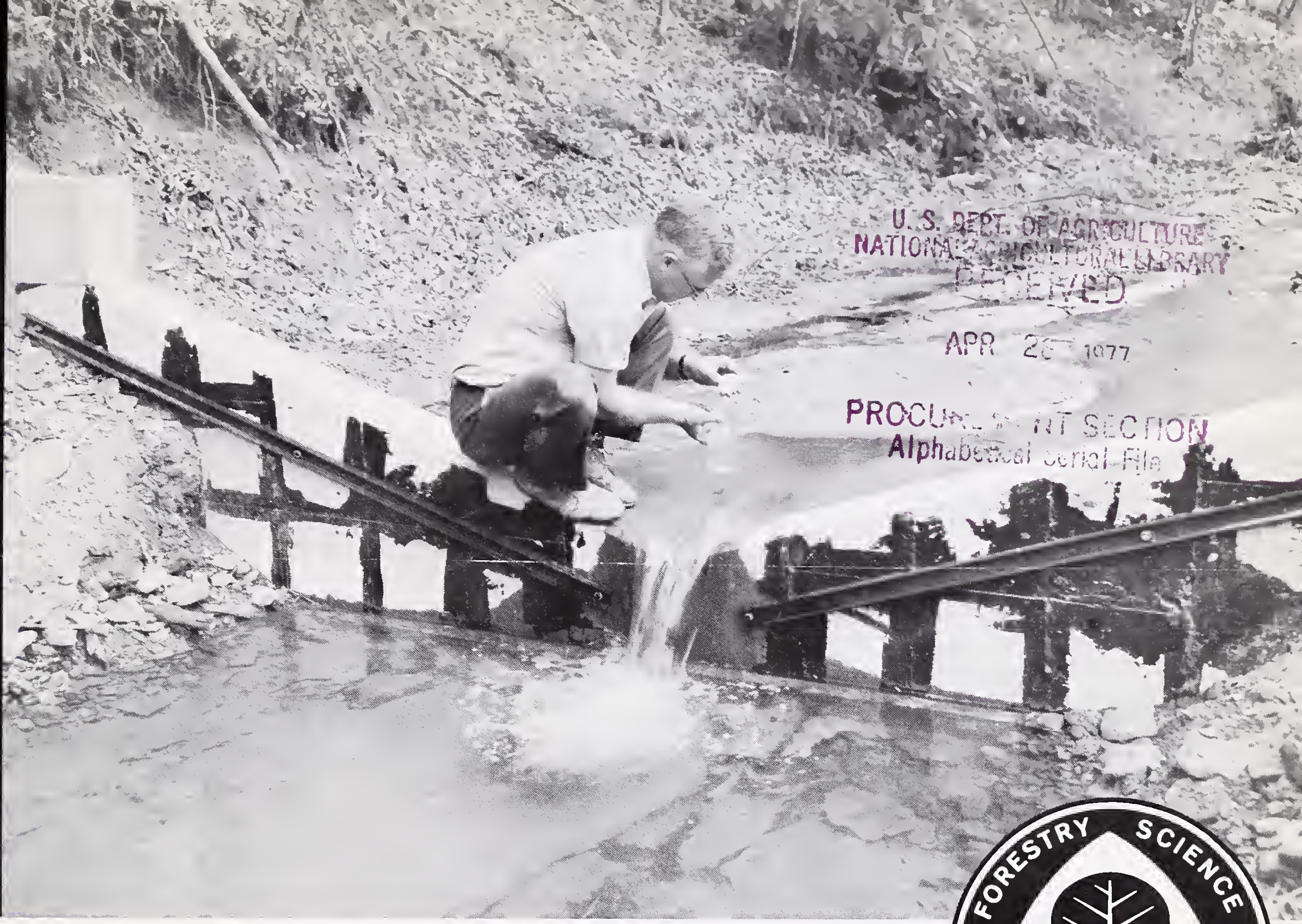

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Forest Service personnel keep tabs on the quality of water flowing through Leatherwood Creek in eastern Kentucky. It is one of several streams, flowing from mined lands, that are gaged to yield scientific information on just how mining affects our water resource.

FORESTRY SCIENCE PHOTO STORY

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PHOTO STORY No. 10

Forestry Research ...

TOWARD A QUALITY WATER SUPPLY

Tapping the forest resource is often a Robin Hood game. Benefits reaped in the harvest of one resource are generally gained at the expense of another.

Take coal mining. Whenever a huge power shovel bites into the earth to yield up tons of valuable fossil fuel for heat, power, dye, or synthetic fabrics, other resources -- like water -- lose out. Even streams and rivers miles below mined areas may be damaged in the process.

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NORTHEASTERN FOREST EXPERIMENT STATION • UPPER DARBY, PENNSYLVANIA 19082

Muddied water from coal-mined land (at left) is not half so appetizing as the clear water that comes from a clear, forest stream.

Forestry scientists, however, are looking at ways to limit such mining damage and to insure clear, unpolluted water despite the harvest of fossil fuel. Forest Service hydrologists stationed at the Northeastern Forest Experiment Station's Berea, Kentucky Laboratory are part of an environmental science team engaged in mined-land restoration research. In hydrological tests underway, they are attempting to learn as much as possible about what happens to the rainwater that falls on mined lands.

To ascertain just how much influence strip-mining has on water quality and streamflow, scientists gaged three tributaries of Leatherwood Creek, and three in Bear Branch, which flow through the heart of the eastern Kentucky coalfields. They tested the water for rates and amounts of flow, as well as for acidity, alkalinity, conductivity, temperature, and mineral content. All this information must be known before remedial steps can be charted.

One of the test tributaries flowed from lands that were 10 percent disturbed by strip-mining operations. Traces of pollution, especially silt, were still evident in the stream up to eight months after mining had stopped.

When the earth is upturned and set aside in the mining operation, rainwater running over it can wash particles down into streams below. Once in the stream this silt-bearing water combines with rainwater that may have run over and dissolved minerals, exposed in the soil. The stream turns murky and sometimes acidic! And you can chalk up another strike against the environment!

The second stream flowed from forest lands that were still active coal producers and 40 percent disturbed. This stream showed heavy pollution.

Another stream is, to date, untouched by mining. However, mining is planned in the area for the near future. Forest Service scientists have several recommendations for protecting this tributary and others like it from becoming environmental sore spots.

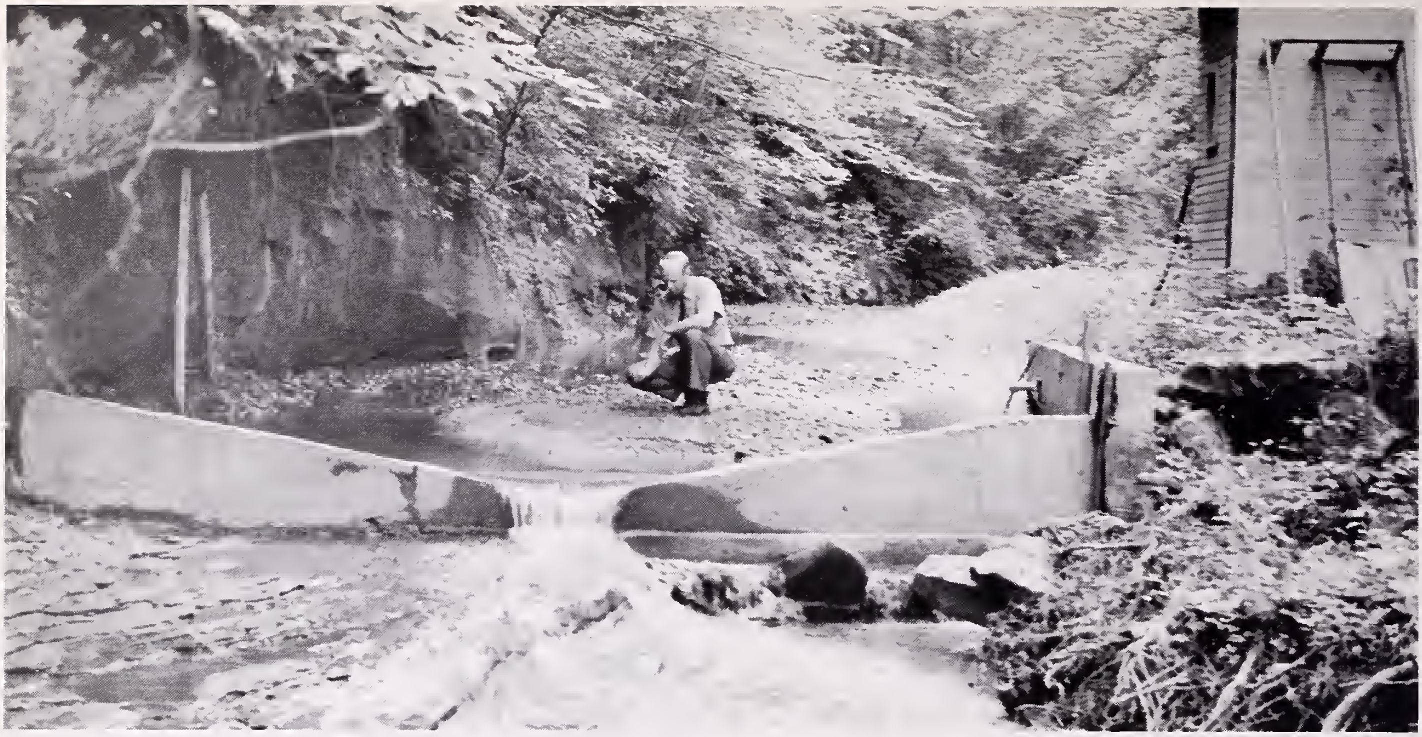
They feel that the key to minimizing damage lies in careful and conscientious efforts before, during, and after mining. Before beginning their mining operations, they suggest that operators plan carefully and familiarize themselves with their surroundings to circumvent the conditions that lead to acidity and siltation.

During mining they recommend use of good mining procedures and care in laying out coal-haul roads and in properly placing and grading spoils.

After mining, effective restoration practices should be put into operation. Controlled overland drainage is helpful in preventing erosion. This means that if water is held and allowed to trickle slowly down a hillside, its force will be reduced sufficiently so as not to dislodge or carry soil particles downslope. However, check dams and earth improvements should be constructed to trap any silt or debris that may enter the stream and to maintain water quality downstream.

In many parts of the country coal operators are making these extra efforts to insure the safety of lands and waters around the coal mines.

A Forest Service hydrologist checks a stream's conductivity. This test tells whether the water contains dissolved salts and is therefor able to pass an electrical current. Dissolved solids in streamflow generally increase following strip-mining.



Tons of silt often settle out of the water that drains from strip-mined lands. A Forest Service hydrologist is posing on a mass of sediment that was trapped in one of the stream-flow measuring weirs. Forest Service engineers have fashioned check dams to collect sediment from strip-mines above and to time its release to ease the effect of strip-mining on water quality.

In the restoration process, ponds can sometimes be constructed on strip-mined lands to provide valuable recreation spots for fishing, swimming, and boating. Pictured below is Fish Pond Lake, in Letcher County, Kentucky. The slopes above Fish Pond Branch were mined in 1946. In the late 1950's, when Bethlehem Steel Company acquired the mined land from its original owner, they decided to build a lake on the site. It has been a thriving recreation venture ever since.